



North Polar Radiative Flux Variability from 2002 through 2014

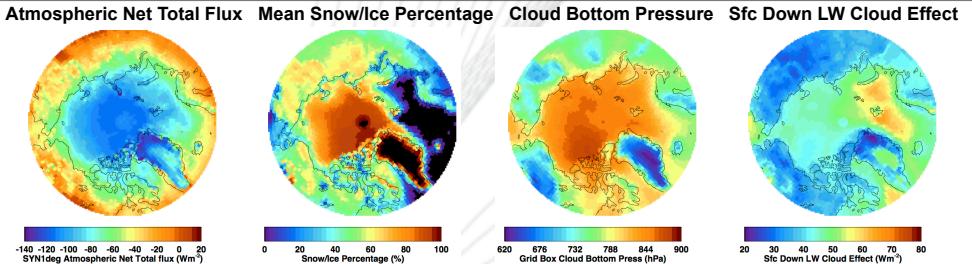


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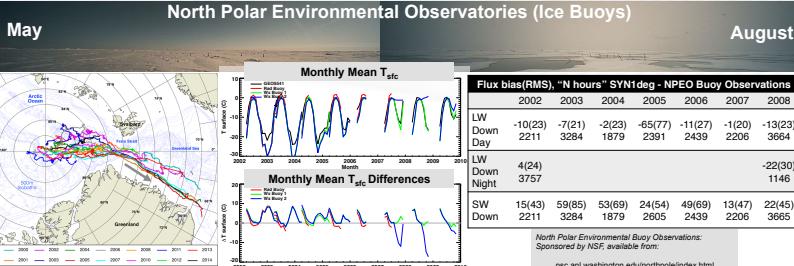
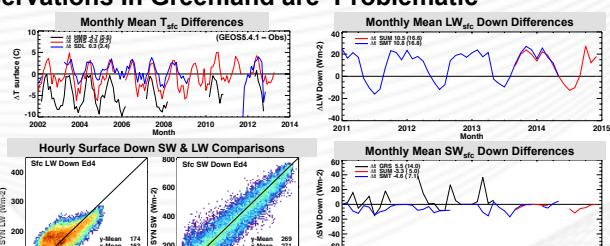
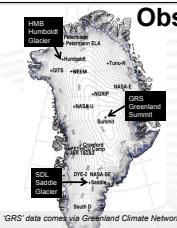
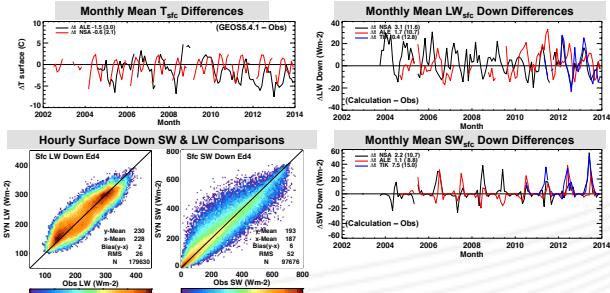
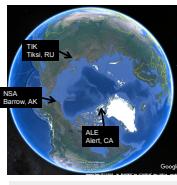
NASA's Clouds and the Earth's Radiant Energy System (CERES) project produces the SYN1Deg data product. SYN1deg provides global, 1° gridded, hourly estimates of Top of Atmosphere (TOA) (CERES observations and calculations) and atmospheric and surface radiative flux (calculations). Examples of 12 year North Polar averages of some variables are shown to the right. Given recent interest in polar science we focus here on TOA and Surface validation of calculated irradiant fluxes.

SYN1Deg data available at: https://ceres.larc.nasa.gov/order_data.php



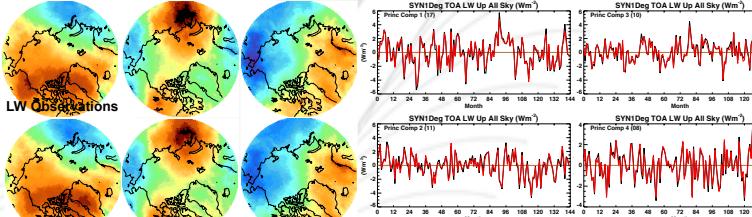
Computed Surface Flux Validation

Fixed Surface Sites Tend To Be The Most Reliable



Top of Atmosphere Validation

Compare Principal Components: Observed (CERES) and Calculated Irradiance.



TOA upward longwave irradiance calculations match the CERES observations well both spatially and temporally with correlations remaining strong through PC 6.

Correlation between Longwave PC Observation and Calculation					
PC 1	PC 2	PC 3	PC 4	PC 5	PC 6
Corr.	0.99	0.97	0.98	0.98	0.82
%Var.	17	11	10	8	6

TOA reflected shortwave irradiance calculations match the CERES observations well both spatially and temporally with correlations remaining strong through PC 7.



Correlation between Shortwave PC Observation and Calculation					
PC 1	PC 2	PC 3	PC 4	PC 5	PC 6
Corr.	0.98	0.96	0.96	0.84	0.90
%Var.	10	7	7	5	5

Compare SYN1Deg Calculations & Meteorological Teleconnections

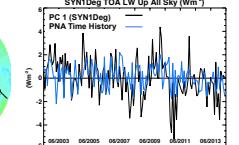
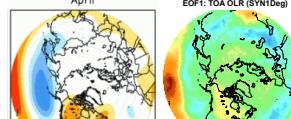
Comparing SYN1Deg calculations to teleconnection patterns requires expanding the area to 30N for EOF analyses.

Correlating the Principal Components of various variables to teleconnection time series indicates which variable is most highly correlated with which teleconnection signal. The tables indicate the Pacific North American Oscillation is most correlated to the EOF 1, and the North American Oscillation is correlated most closely to surface LW flux down EOF 1.

Patterns and time histories are shown to the right.

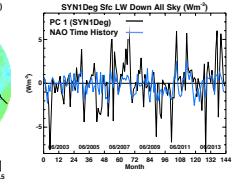
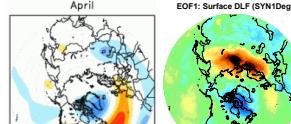
Teleconnection data downloaded from NOAA's Climate Prediction Center
www.cpc.ncep.noaa.gov

Correlation of SYN1Deg OLR with Teleconnections				
PC 1	PC 2	PC 3	PC 4	PC 5
AO	0.15	0.18	0.03	0.05
PNA	0.49	0.10	0.02	0.06
NAO	0.03	0.15	0.24	0.34



PNA & NAO teleconnection patterns are calculated from rotated principal components of 500mb height anomalies. (Jan 1950 thru Dec 2000)

Correlation of SYN1Deg Surface LW Down with Teleconnections				
PC 1	PC 2	PC 3	PC 4	PC 5
AO	0.04	0.34	0.02	0.12
PNA	0.06	0.05	0.20	0.40
NAO	0.46	0.24	0.23	0.02



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